**Assignment 1**

**DEVICES: 3D LED DISPLAY**

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1. **HISTORY**

The first commercial LEDs were commonly used as replacements for [incandescent](http://en.wikipedia.org/wiki/Incandescence) and [neon](http://en.wikipedia.org/wiki/Neon_lamp) indicator lamps, and in [seven-segment displays](http://en.wikipedia.org/wiki/Seven-segment_display). First in expensive equipment such as laboratory and electronics test equipment, later followed in such appliances as TVs, radios, telephones, calculators, and watches.These red LEDs were bright enough only for use as indicators, as the light output was not enough to illuminate an area. Later, other colors grew widely available and also appeared in appliances and equipment. As LED materials technology grew more advanced, light output rose, while maintaining efficiency and reliability at acceptable levels. The invention and development of the high power white light LED led to use for illumination, which is fast replacing incandescent and fluorescent lighting.The first high-brightness blue LED was demonstrated by [Shuji Nakamura](http://en.wikipedia.org/wiki/Shuji_Nakamura) of [Nichia Corporation](http://en.wikipedia.org/wiki/Nichia_Corporation). It was based on [InGaN](http://en.wikipedia.org/wiki/Indium_gallium_nitride) borrowing on critical developments in [GaN](http://en.wikipedia.org/wiki/Gallium_nitride) nucleation on sapphire substrates and the demonstration of p-type doping of GaN. In 1995, [Alberto Barbieri](http://en.wikipedia.org/w/index.php?title=Alberto_Barbieri&action=edit&redlink=1) at the [Cardiff University](http://en.wikipedia.org/wiki/Cardiff_University) Laboratory (GB) investigated the efficiency and reliability of high-brightness LEDs. The existence of blue LEDs and high efficiency LEDs quickly led to the development of the first [white LED](http://en.wikipedia.org/wiki/Light-emitting_diode#Phosphor-based_LEDs).

The development of LED technology has caused their efficiency and light output to [rise exponentially](http://en.wikipedia.org/wiki/Exponential_growth), with a doubling occurring about every 36 months since the 1960s.In 2009, a process for growing gallium nitride (GaN) LEDs on silicon has been reported. [Epitaxy](http://en.wikipedia.org/wiki/Epitaxy) costs could be reduced by up to 90% using six-inch silicon wafers instead of two-inch sapphire wafers.Generally, all the LED products can be divided into two major parts, the public lighting and indoor lighting. LED uses fall into four major categories:

1. ***Visual signals*** where light goes more or less directly from the source to the human eye, to convey a message or meaning;
2. [***Illumination***](http://en.wikipedia.org/wiki/Lighting) where light is reflected from objects to give visual response of these objects;
3. ***Measuring and interacting*** with processes involving no human vision;
4. ***Narrow band light sensors*** where LEDs operate in a reverse-bias mode and respond to incident light, instead of emitting light.

**1.1 SPECIFICATION**

By definition, a 3D display is any [display device](http://en.wikipedia.org/wiki/Display_device) capable of conveying a [stereoscopic](http://en.wikipedia.org/wiki/Stereoscopy) perception of 3-D depth to the viewer. The basic requirement is to introduce offset images that are displayed separately to the left and right eye. Then both of these 2-D offset images are combined in the brain to give the perception of 3-D depth. The use of LED backlighting allows a thinner panel, lower power consumption, better heat dissipation, a brighter display, and better contrast levels.The 3D display is named by 4 important categories. They are

* 1. Stereoscopic-It is a technology which provides a different image to the viewer's left and right eyes. Examples of this technology include [anaglyph images](http://en.wikipedia.org/wiki/Anaglyph_image) and [polarized](http://en.wikipedia.org/wiki/Polarized) glasses. Stereoscopic technologies generally involve special [spectacles](http://en.wikipedia.org/wiki/Spectacles).

b. Autostereoscopic-Technologies use optical components in the display, rather than worn by the user, thus enable each eye to see a different image. -It displays provide multiple views of the same scene, rather than just two. Each view is visible from a different range of positions in front of the display. This allows the viewer to move left-right in front of the display and see the correct view from any position. Example technologies include [parallax barriers](http://en.wikipedia.org/wiki/Parallax_barriers) and [specular holography](http://en.wikipedia.org/wiki/Specular_holography).

c. Computer-generated holography-Research into holographic displays has produced devices which are able to create a [light field](http://en.wikipedia.org/wiki/Light_field) identical to that which would emanate from the original scene, with both horizontal and vertical parallax across a large range of viewing angles.

d. Volumetric displays-Use some physical mechanism to display points of light within a volume. Such displays use [voxels](http://en.wikipedia.org/wiki/Voxel) instead of [pixels](http://en.wikipedia.org/wiki/Pixel). Volumetric displays include multiplanar displays, which have multiple display planes stacked up, and rotating panel displays, where a rotating panel sweeps out a volume.

Each of these display categories can be seen to have limitations, whether the location of the viewer, cumbersome or unsightly equipment or great cost. Trendy, there are three forms of LED may be used which are

* + *White edge*-LEDs around the rim of the screen, using a special diffusion panel to spread the light evenly behind the screen;
  + *Dynamic RGB*- LEDs behind the panel;
  + *A full array* of LEDs arranged behind the screen whose brightness cannot be controlled individually.

1. **FUNDAMENTAL TECHNOLOGY**

As to have a clearer picture, a possible application is taken into consideration. For instance public areas such as LRT station, airport or any counter at bank where access for information is vital. This form of display helps to reduce congestion of people crowding around the traditional message panel. Therefore, basic unit could be described as below:

1. Message Displayed

* It is made up of a single column of pulsating LEDs. It will display the text messages when being rotated.

1. 360° Viewing Angle

* The message can be read from any angle around the rotating display horizontally and around 90° vertically.

1. The Message is Programmable

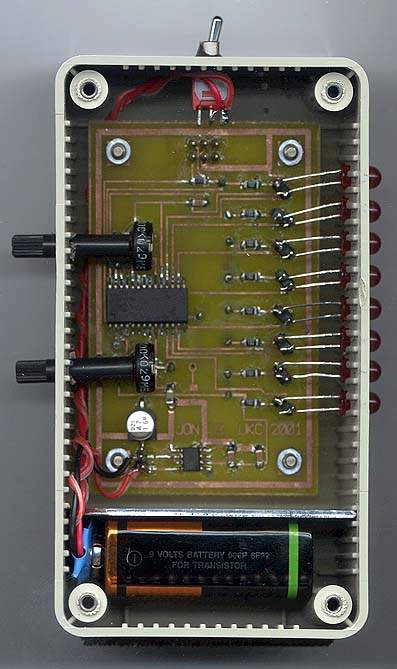
* To update the message, unit of microprocessor can receive data from an Infra Red link.

1. The Scrolled Message

* The drum position and synchronises the message scan can be detected by an I/R sensor. As such manage to create either a still or scrolling message.

The complete prototype display demonstration unit consists of:

1. A microprocessor used to store displayed message, LED column codes for all alpha- numeric characters and etc;
2. A circuit diagram of the prototype;
3. Hardware construction;
4. PP3 9 volts battery
5. LED
6. 2 controls for message select and message scan rate
7. PIC microprocessor chip placed between the 2 controls
8. On and Off switch
9. Pin in circuit debug connector located below the switch
10. Counter balance unit
11. Motor Drive unit using cooling fan.



Complete Display Unit

1. **PROS AND CONS**

The 3D LED display is new technology and rapidly moving towards replacing older technology which is using CFL backlight (Fluorescent). The LED backlighting considered as a better new technology for the 3D reproduction. The 3D content could be well presented because of deeper blacks and longer lasting brightness of technology that found in 3D LED display. Even though the technology used in 3D LED far advanced compared to previous technology, it also have some cons since it’s relatively new to the market. Some of the advantages and disadvantages of 3D LED Display has been identified and listed as follows.

**Pro**

* Representation of multi view capturing
* Providing sharper images
* Faster refresh and bit rate
* The dynamic contrast is better
* The colour range is wider
* Improved contrasted ratio
* Response time is very fast
* Consume less energy (40% less than fluorescent)
* very thin in design
* colour accuracy very high

**Cons**

* Costly compared to previous technology
* Require 3D projectors or 3D glassed which are pricy
* Having some flickering light effect
* Require special 3D transmitter
* Require active shutter glassed which needs batteries
* Viewers are restricted to only certain angle and distance.
* May lead the device failure in high ambient temperature.
* Black levels are not consistent

1. **TECHNICAL ISSUES**

Due to uneven backlighting, dim and hot spots would be found in screen where some potion of area lit better than other area. It shows up a streaks or spots of light on the screen. It was seen edge lit LED display unit where each individual light bank around the edges of screen. These will displays a crosshatch pattern which normally doesn’t have an serious effect for viewers but can be notice some areas in screen shows less details during dark scenes. The problem of higher black level can be washed out from screen when 3D LED display has contrast degradation at angel starting at 25 deg and producing from there. The images and screen able visible, but the contrast is such an integral part of display unit’s performance that this deficiency is definitely worth noting. Some LED display with local dimming backlighting may generally perform better in this area. Edge lit LED display units will have a harder time maintaining contrast and black levels at side viewing angles. This is area which should improve in future in order to increase the quality of side angle viewing. LED back lighting allows for extremely very thin construction, better contrast and truer whites, especially for local dimming LED screen but by using an LCD panel they inherit the motion blur, off angle viewing and black level problems of the parent technology.

1. **FUTURE ADVANCEMENT / NEW IDEAS**

Technology is growing day by day, including in the field of electronics that use LED display in a particular product or device. The modern transformation of the electronic product offers superior imaging technology and extraordinary premium to give more pleasure to watch. Television is one of the devices that used the concept of 3D LED display. Through it, viewers will be brought down the world-view television as if the soul with the support of quality and space arises more clearly. To enable viewers to enjoy a more comfortable 3D viewing, they will be equipped with special glasses that are designed to use liquid crystals. Weighing only 30 grams, the glasses come in two models namely the use of rechargeable batteries or via USB connection. Besides that, viewers are restricted only to a certain angle and distance to get the best view of 3D images or videos.

In future, perhaps the viewers can see the 3D LED display without wearing special glasses that are provided. This will provide greater comfort or satisfaction in watching TV. Hopefully, 3D LED display will further enhance the electricity savings of 40% to 50%. In addition to television, 3D LED display can also be used for promotional purposes. This figure show 3D LED display is made from cube of 512 LED cycle through an array of hologram-like. So the promotion about the product can be more attractive.

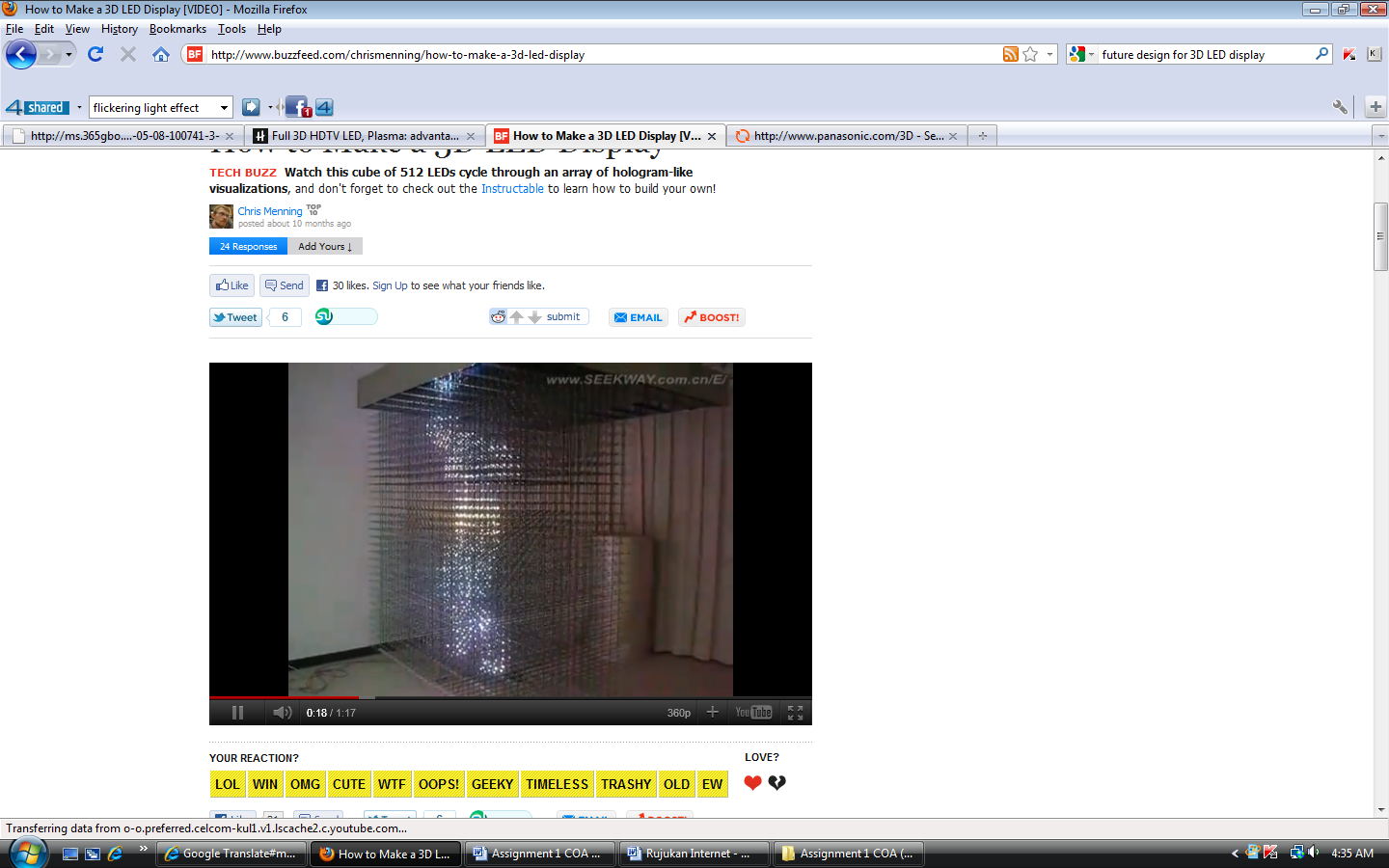


Figure 1 : Hologram from 3D LED display

1. **REFERENCES**
2. <http://ms.wikipedia.org/wiki/Diod_pemancar_cahaya>
3. <http://www.ubaya.ac.id/ubaya/articles_detail/8/LED-TV-vs-LCD-TV-vs-Plasma-TV--mana-yang-pantas-dibeli-.html>
4. <http://en.wikipedia.org/wiki/LED-backlit_LCD_television>
5. <http://www.ledtele.co.uk/ledvslcd.html>
6. <http://en.wikipedia.org/wiki/LED_display>
7. <http://eternaltreasures.hubpages.com/hub/Full-3D-HDTV-advantages-and-disadvantages-includes-popular-commercially-available-3d-tv-models-ready-to-order>
8. <http://www.buzzfeed.com/chrismenning/how-to-make-a-3d-led-display>.
9. <http://www.articlesbase.com/electronics-articles/features-of-3d-led-tv-sets-1982213.html>